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THE ARRANGEMENT OF RURAL POPULATIONS

By M. AUROUSSEAU

University of Western Australia, Perth

The distribution of population, which may be defined as the relative density of population per unit of area in different regions, has been the subject of considerable study by geographers. In many regions of a given density, however, the study of good maps of a scale of not less than 1:100,000 will often indicate, while actual examination of such regions will confirm, the presence of a finer adjustment, which is expressed in a characteristic grouping of dwellings. To this grouping the term "arrangement" has been applied.¹

During the course of the war, the writer was enabled to make extensive observations on the subject in Egypt, France, Belgium, and England, the results of which are of considerable interest. The evidence collected in the field was very striking, and a research into the literature of the subject which is available in Australia indicates that it has received very little definite recognition by geographers with the exception of those of the French school; who refer occasionally to agglomerations and disseminations, which are only the extreme types. Various writers dealing with particular regions refer incidentally to the grouping which prevails throughout or in parts of the regions concerned; but with the exception of the village community, which possesses an extensive economic literature² there has been no attempt to co-ordinate the various existing arrangements or to discuss their origin and significance.

It was evident at the outset that the geographic study of the arrangement of rural populations must proceed hand in hand with that of the historical and economic aspects of the question. Robinson's *History of Western Europe*³ and Ashley's *Economic History*⁴ served as excellent starting points in the latter respect. The geographic method was that followed by Privat-Deschanel⁵ and Griffith Taylor⁶ who begin with the natural region.

¹ M. Auroousseau: The Arrangement of the Rural Population in Picardy and Flanders, *Geogr. Journ.*, Vol. 51, 1918, pp. 393-394.

² G. L. Gomme: *The Village Community*, London, 1890.

Paul Vinogradoff: *Villainage in England*, Oxford, 1892.

Frederic Seebohm: *The English Village Community*. Reprinted from the fourth edition (1905). Reissue, London, 1913.

H. S. Maine: *Village-Communities in the East and West*. 2nd edit., London, 1872. References to German authorities.

³ J. H. Robinson: *An Introduction to the History of Western Europe*, 2 vols., Ginn & Co., Boston, 1902-04. Numerous references.

⁴ W. J. Ashley: *An Introduction to English Economic History and Theory*, Vol. 1, Part I, London, 1913, Vol. 1, Part II, London, 1914. Numerous references to French and German authorities.

⁵ Paul Privat-Deschanel: *The Influence of Geography on the Distribution of the Population of Scotland*, *Scottish Geogr. Mag.*, Vol. 18, 1902, pp. 577-587. Originally published in the *Bull. Soc. de Géogr. de Lyon*, Vol. 17, 1901-02, pp. 545-559.

⁶ Griffith Taylor: *Geographical Factors Controlling the Settlement of Tropical Australia*, *Queensland Geogr. Journ.*, Vols. 32-33, 1918, pp. 1-67.

It was found that, at the present day, in civilized countries which possess a high degree of social freedom each natural region tends to develop a characteristic form of arrangement of its rural population, while in more backward countries social organization is a more powerful factor than physiography. The historic tendency is, in general, for an initial social arrangement to break down with advancing civilization and to be replaced by a more appropriate response to physiographic conditions. The geographer can therefore recognize at the present time various forms of agglomerations, partial agglomerations, and disseminations. They are not susceptible of systematic classification but are none the less real, being in each case a delicate expression of the social condition or physiography of the region concerned, or of both. In many instances arrangement in both the horizontal and vertical senses is discernible.

Agglomerations

The following forms of rural agglomerations are recognizable: small towns, villages, true village communities, and hamlets. In each case they owe their existence to some important social or geographic factor and, in themselves, exhibit an infinite variety of character and build, which changes from region to region.

SMALL TOWNS

Small towns are found in regions where the soil is very poor or restricted in extent; in oases, where irrigation is necessary for agriculture; and where defense is the prime necessity. As an instance of the first case we may take the country around Moscow, where the soil is so wretched—sandy or marshy—that rural industries entirely supplant agriculture and the whole population of the region has grouped itself into a number of small towns and villages.⁷

The oasis of Khargeh is an illustration of the second case, where the entire population of an area dependent on irrigation from an ancient Roman system of aqueducts and artesian wells has concentrated into one small town.⁸

In the mountainous regions of Algeria the population is grouped into small towns. Good soil is restricted in extent, and the need of segregation for defensive purposes is considerable. The arrangement, however, is eminently suitable to the population of fruit growers, whose farms are small and close to the towns.⁹

⁷ Alexander Woeikof: Le groupement de la population rurale en Russie, *Ann. de Géogr.*, Vol. 18, 1909, pp. 13-23.

⁸ H. L. Breadnell: An Egyptian Oasis, London, 1919.

Mark Jefferson: Utah, the Oasis at the Foot of the Wasatch, *Geogr. Rev.*, Vol. 1, 1916, pp. 346-358, compares the Utah towns at the foot of the Wasatch with the Khargeh and the other oases of the Libyan Desert.

⁹ Augustin Bernard and Edmond Doutté: L'habitation rurale des indigènes de l'Algérie, *Ann. de Géogr.*, Vol. 26, 1917, pp. 219-228.

VILLAGES

Villages, other than those of frontier marches, which exist for defensive reasons, and those of backward, barbaric, or savage countries, or those resulting from some unusual physiographic condition, are very frequently survivals, though in form only, of ancient systems of government and social organization. Their origin, which has been discussed at length by Seebohm and others, is an economic problem, but their survival is a geographic one. With this we will deal in a description of Picardy and South Wiltshire.¹⁰

VILLAGE ARRANGEMENT IN PICARDY

The name Picardy, like many of the provincial names of pre-Revolutionary France (*noms de pays*), belongs to a fairly well defined natural region.

Picardy is a lonely-looking land of low, naked, rolling hills, cut by tortuous mature valleys. Here and there a village is seen, frequently nestling in a hollow and closely-circled by trees. Otherwise there is not a house in sight, though the greater part of the country is under cultivation. A winding belt of poplars marks a neighboring valley, and a regular row of elms reveals a main road on the horizon. Other vegetation there is none, save an occasional dense wood of young trees on high ground. One seldom sees old trees in France. The underlying formation almost everywhere is the chalk with flints (Senonian) of the Upper Cretaceous, which yields a poor and shallow soil on the terraced hillsides. Occasional patches of alluvial soil, *terre à betteraves*, exist, especially where the low hills expand into small plateaus. The climate is continental and humid, moderated by proximity to the sea but becoming more rigorous inland. The villages are compact, generally several kilometers apart, dotted over the land quite regularly, and connected by good roads, too numerous for inter-village communication alone. The land has hence a characteristic "knotted and netted" appearance. The farmer lives not on his farm, far from neighbors, in a bleak and melancholy country, but in the village, setting out daily with his team, one of the numerous roads serving his convenience.

The village arrangement in Picardy is a survival, though in form only, of the manorial system, in many cases of the Roman system, or even of the primitive village community. The very common terminations *-ville* and *-court* in place names and the château with its park testify in many villages to the former existence of manors or villas, while the universal occurrence of *remblais*, or terraces on the hillsides, and of embanked and sunken roads is evidence of the ancient open field system of cultivation. That the arrangement has survived long after the restriction of ancient land tenure¹¹ has been removed is explained by the physiography of the

¹⁰ See also M. Auroousseau: A Contrast in Chalk-Lands, *Scottish Geogr. Mag.*, Vol. 36, 1920, pp. 158-161.

¹¹ Ashley, *op. cit.*, Vol. 1, Part I.

country. The chalk hills are dry, which is expressed in such place names as Sailly-le-Sec, Avesnes-le-Sec; and permanent supplies of good ground water are only obtainable in the valleys, or at the intersections of joints or faults in the chalk, or by the sinking of very deep wells.¹² Dwellings are hence concentrated around points of assured water supply. Horses are watered at the communal pond of each village, which contains water throughout the year and is fed by the run-off from the roofs and streets; but it is no uncommon sight to see casks of water being taken on sledges from the villages to the browsing cattle in the fields. The dew pond appears to be unknown. The country being agricultural, it has been necessary to spread the villages evenly over the land. Wherever possible, a low site has been chosen to ensure protection from the wind; but villages on elevated sites are by no means uncommon. All the villages are old, and increase in population is expressed by expansion of existing villages rather than by establishment of new ones. A variety of crops is grown, but the only important industries are the extraction of beet sugar and the manufacture of bricks. Occasionally, as where a small, swift stream has supplied power, a village has expanded into a small industrial town (e.g. Albert-sur-Ancre). In the east of Picardy and Artois the white chalk (Senonian) thins out, and the ground water level rises accordingly, permitting the existence of a few isolated farms and dwellings such as those around Le Cateau.

An arrangement which closely resembles that of Picardy is to be found on the same geological formation in parts of Hainault.¹³

VILLAGE ARRANGEMENT ON THE SOUTH WILTSHIRE DOWNS

South Wiltshire has many points of resemblance to Picardy but in other ways offers sharp contrasts. Its dominating feature is the chalk area of Salisbury Plain, a bare, rolling expanse of turf-covered downs, 500 to 800 feet above sea level and untilled except in the neighborhood of the valleys. The sweeping hills have a convexity of outline which is characteristic of chalk topography. The woods and copses are poor and scattered at random. The "Plain" is dissected by dry valleys, "winter bourns,"¹⁴ and five small streams which converge on Salisbury like fingers joining a hand. The stream valleys are comparatively straight but are in the early stages of mature development, their floors of rich, deep alluvium stretching out into broad water meadows and wooded parks. The whole region is bleak and of more rigorous climate than the surround-

¹² Henri Hitier: *Le village picard*, *Ann. de Géogr.*, Vol. 12, 1903, pp. 109-119.

Albert Demangeon: *La Picardie*, Paris, 1905, pp. 372-386. See especially Fig. 27, p. 373, showing the phenomenon of agglomeration on the chalk plateaus in contrast with that of dispersion in the region of Normandy.

¹³ Maurice Leriche: *Les régions naturelles de la Belgique*, *Rev. de l'Université de Bruxelles*, Vol. 19, 1913-14, pp. 185-217.

¹⁴ W. H. Hudson: *A Shepherd's Life*, London, 1919.

ing districts; but the Plain is, and always has been, one of the most free and open regions of England. The most extensively developed formation is the chalk with flints (Senonian). Ground water is confined to the lower-lying areas in the valleys, and its absence on the high downs is to some extent compensated by the construction of dew ponds.

Salisbury Plain from the earliest times has had considerable interest in the present connection. This open spot in ancient, forest-clad Britain attracted an early population, traces of which such as the long barrows, round barrows, Stonehenge, and the early British earthworks of Yarnbury Castle and Codford Circle are abundant. In Saxon times the Plain was probably occupied under the tribal system. The Danes coveted the area and were met and beaten on it by Alfred the Great at Edington. The Romans occupied it extensively, as Old Sarum, traces of roads, and the remains of villas near Warminster testify. With the clearing of the valleys the population forsook the high downs, took to the low ground, and settled down to sheep farming and weaving, which persisted through the manorial ages until the industrial revolution.¹⁵ Since then weaving has ceased, the old, horned downland sheep has become extinct,¹⁶ and pastoralism is slowly yielding to agriculture.

At the present time, small, decadent, but beautiful villages are scattered along the valleys or nestle in lonely and sheltered spots. The only village on high ground known to the writer is Mere on the very southwestern corner of the Plain. Isolated dwellings are extremely rare. The villages of South Wiltshire are similar in origin to those of Picardy. They represent the surviving form of the ancient manors, many of the manor sites being still in evidence; while the occasional occurrence of *linchets*, which correspond to the *remblais* of Picardy, is an expression of the old methods of agriculture.¹⁷ The village system is imposed at the present day owing to the exigencies of water supply. It is noteworthy, however, that, whereas the agricultural population of Picardy has spread evenly over the whole area and frequently occupies high ground, the pastoral population of Salisbury Plain is confined to the valleys and other low ground. From being formerly an attractive area to population the Plain has now become a relatively repellant area. This description is applicable to many other parts of the English chalk lands, especially in northern Hampshire.

VILLAGES ON CALCAREOUS FORMATIONS

The two foregoing instances illustrate the extraordinary power possessed by calcareous formations in determining the survival of villages. Examples could be multiplied to such an extent that we can distinguish a class of

¹⁵ Arnold Toynbee: *Lectures on the Industrial Revolution of the Eighteenth Century in England*, London, 1884.

¹⁶ P. McConnell: *The Elements of Agricultural Geology*, London, 1902.

¹⁷ Gomme, *op. cit.*

survivals which we will term the *lime land villages*. Gallois describes the parallel case of the calcareous plateau of La Beauce,¹⁸ and Gravier notes the strong influence of limestone in parts of Lorraine.¹⁹

A further type of control exhibited by calcareous formations is to be seen in the *marginal girdle villages*, which occur on the spring line around the edges of many calcareous areas. For instance "in part of the Weald district the parishes are long and narrow, crossing the strike of the strata at right angles and securing to each a strip of sheep pasture on the chalk downs, a strip of dry but water-bearing rock suited for a village site on the Upper Greensand, a strip of stiff arable land on the Gault, and a strip of rough cattle pasture on the Lower Greensand, where the river runs with its water carriage and water power."²⁰ Again, in the region of La Vôge in the upper basin of the Saône a line of villages is found on the marls bordering the limestones on the left bank of the Saône and also on the western margin of the Vôge, where no less than 20 villages occur in a distance of 35 kilometers. Cereals are grown on the limestones while the marls are used for pasture and the sandstone for forestry.²¹ A well developed belt of marginal girdle villages exists also around Salisbury Plain.

"WET POINT" AND "DRY POINT" VILLAGES

Apart from the arrangements determined by the peculiarities of the hydrography of calcareous formations we have two special cases of arrangements governed by water supply—the extreme conditions giving rise to what we will term *wet point villages* and *dry point villages*. The former class is exemplified by the villages of the Grodno, Minsk, and Mohilev Governments in Russia, situated on the *terre noire* which provides but scanty and localized supplies of permanent ground water.²² Woeikof also gives instances of dry point villages in the marshy regions in the south of Minsk, but the most striking case is that of the Nile Delta, which we will describe in detail.

The Nile Delta is an area of most unusual fertility, a flat expanse of deep, rich loam and black mud dissected by the uncertain branching river and cut by numerous canals. For the greater part of the year it is an emerald expanse of crops of infinite variety. The date palm alone, in clumps and groves, rears itself above the common level. There is nothing except the dazzling whiteness of a sheik's tomb or a drab mud village to relieve the eye of the green monotony until the distant line of the brown desert is reached. A complex system of irrigation has pushed intense

¹⁸ Lucien Gallois: *Régions naturelles et noms de pays: Étude sur la région parisienne*, Paris, 1908; p. 55 *et sqq.*

¹⁹ Gaston Gravier: *La Plaine Lorraine*, *Ann. de Géogr.*, Vol. 19, 1910, pp. 440–455.

²⁰ H. R. Mill: *The Development of Habitable Lands: An Essay in Anthropogeography*, *Scottish Geogr. Mag.*, Vol. 16, 1900, pp. 121–138; reference on p. 131.

²¹ A. Cholley: *La Vôge*, *Ann. de Géogr.*, Vol. 23, 1914, pp. 219–235.

²² Woeikof, *loc. cit.*

culture to the very border of the desert and beyond it. With water highways and primitive transport, roads are few and narrow. Irrigation channels and a few hedges are the only boundaries of fields. The climate is subtropical and rainless, with great ranges of temperature in winter.

The general landscape gives no adequate idea of the teeming population which lives in the thickly scattered villages. These are compact, crowded collections of small buildings, house next to house, made of sun-dried bricks and more or less walled in. The only isolated buildings are the white, domed tombs of sheiks. The villages are mostly situated on slight eminences composed of rubbish and representing the accumulation of centuries of building and rebuilding on the same site.²³ There are few large towns, and cities do not encroach on the valuable land of the delta. Cairo itself, situated at the apex, is extending a horn of suburbs to the northeast, not on the alluvium but between "the desert and the sown." This arrangement of dense nuclei, sited on mounds, without isolated dwellings, is rendered necessary by the extreme liability of the area to annual inundation.

Prolonged Turkish misrule has so effectively obliterated old institutions in Egypt that in Lane's time the *fellahin* had been reduced to the condition of wretched laborers. They held no property, the land being in the hands of the pasha class or of foreign landowners. Now, however, the *fellah* is frequently a small landowner. The land is steadily passing back into Egyptian hands, but the liability to inundation will effectively block any tendency towards dissemination in spite of the increase of the number of small holdings.

Dry point villages similar to those of Egypt are found also in the low lying parts of Flanders, on the landward side of the dune belt. They consist of strings of houses built on dykes or canal banks out of reach of inundation.²⁴ In the same category may be placed villages situated on alluvial cones in the Alpine valleys. A classical example is seen in the Rhone valley in Valais where each cone has its village thus placed above the intervening marshy flats.

"STRONG POINT" VILLAGES

Passing from the village survival, we will consider villages which have originated for defensive reasons. Defense is usually a secondary factor and is frequently no more than a temporary one. The villages south of the Oka, in Russia, were founded in the sixteenth century, land being granted in return for military services. The province was hence a frontier march. In the northern Caucasus also a similar state of affairs existed until 1864, when the land became secure and dissemination ensued with

²³ E. W. Lane: *An Account of the Manners and Customs of the Modern Egyptians*, 2 vols., London, 1837; reference in Vol. 1, pp. 28-29. On the village type in Egypt see also Jean Brunhes; *La géographie humaine*, Paris, 1912, pp. 135-141.

²⁴ Raoul Blanchard: *Flanders, Geogr. Rev.*, Vol. 4, 1917, pp. 417-433.

the production of small hamlets and isolated farms. The hamlets are proportional to the sizes of the estates.²⁵ Defensive villages are best developed in that shifting human region which exists on racial and international frontiers—the zone of strife. It has not received much acknowledgment as a human region. Such villages might well be termed *strong point villages*.

Villages owing their existence to special physiographic conditions are characteristic of areas of diverse physiographic elements, i.e. areas which do not form parts of well defined natural regions. They are extremely numerous, and the controlling factors are diverse. The studies of Faucher, and in particular of Sorre, are excellent in this connection. Faucher works out the siting of villages on the basis of soil, water supply, distribution of forests, etc., in Valence,²⁶ while Sorre has made a detailed geographic and historical study of part of Catalonia.²⁷ Sorre concludes that an historically uniform type is being replaced by a small number of forms geographically differentiated by concentration, at the expense of the intermediate elements (the hamlets). Rabot has carried out similar work in Sweden, where climate, soil, and the timber industry appear to be the important factors. He also remarks on the effects of calcareous formations.²⁸ The influence of powerfully developed physiographic features of an uncommon kind is well exhibited in the Norwegian fiord districts, where the small deltas at the heads of the fiords afford almost the only cultivable land and determine the sites of the small population centers.²⁹ Such centers may be termed *food point villages*, the occurrence of which might be expected in the borders of those regions particularly hostile towards man that Fleure has designated the “zone of hunger”³⁰ and on barren oceanic islands.

VILLAGE COMMUNITIES

In barbaric and backward countries the village community is still in existence in many places. The conditions of social organization are such that the village arrangement is the only possible one, regardless of whether it be suited to the geographic conditions or not. Woeikof has described districts of the government of Kazan where the entire population dwelt in villages, where no personal property existed, everything belonging to the state or to communities of peasants.³¹ In parts of Lorraine community

²⁵ Woeikof, *loc. cit.*

²⁶ D. Faucher: La plaine de Valence, *Ann. de Géogr.*, Vol. 23, 1914, pp. 127-150.

²⁷ Maximilien Sorre: Groupement des populations dans la Catalogne septentrionale, *Ann. de Géogr.*, Vol. 20, 1911, pp. 69-73.

²⁸ Charles Rabot: La distribution de la population en Suède en fonction de la constitution géologique du sol, *La Géographie*, Vol. 11, 1905, pp. 359-367.

²⁹ Hagbart Magnus: Zur Siedelungskunde von Norwegen, *Zeitschr. der Gesell. für Erdkunde*, Berlin, Vol. 33, 1898, pp. 367-392.

³⁰ H. J. Fleure: Human Regions, *Scottish Geogr. Mag.*, Vol. 35, 1919, pp. 94-105. This classification of world regions according to “the measure of the earth’s response to man’s efforts” has been noted in the *Geogr. Rev.*, Vol. 8, 1919, p. 277.

³¹ Woeikof, *loc. cit.*

life still survives in many ways.³² The villagers still work in common, though common cultivation has long disappeared. The villages of the plains in Palestine still preserve many common customs, the land being often owned by the villagers in common and a fair division of it taking place every year or two.³³ The Indian village community has been the subject of exhaustive study by Sir Henry Maine, who draws many western parallels from the works of Nasse and Maurer, and more recently by B. H. Baden-Powell, who has specially investigated the economic side.³⁴

The village community must have existed in nearly every part of India, and there are abundant evidences of its survival. It is interesting, however, to note the exceptions which Matthai³⁵ quotes from Baden-Powell.

First, the British Himalayan districts which contain a limited area of flat land and occasional patches of good soil on the hill side. People live here in single homesteads or in very small groups of two or three families. Secondly, along the west coast towards the south—the districts of North Kanara, South Kanara, and Malabar—the land here lying between the sea and the Western Ghat mountains is constantly intersected by hills and rivers and wide ravines. The inhabitants generally live in isolated homesteads, each with its own garden. Thirdly, the districts in the South Punjab below Multan where the country is so rainless that permanent cultivation is possible only under exceptional circumstances. To these may be added the tract of country along the North-West Frontier—Baluchistan, the North-West Frontier Province, and parts of Sind—where society is still organized in tribal rather than in village communities.

The village communities of savage and primitive races have been described by Gomme.³⁶

The fate of the village community is invariably to disappear before the advance of ideas and to give way to the arrangement best suited to the geographic environment. The transition has actually been observed, as before mentioned, in the northern Caucasus but is best illustrated by the effects of voluntary and enforced enclosure of the common fields, which accompanied the agrarian revolution.³⁷ Slater's geographic study of the English parliamentary enclosures is noteworthy in this connection. He found, on plotting the enclosures, that they had a very definite distribution in an area stretching from Flamborough Head to the Solent, where the common field system had persisted in spite of all hostile attempts to crush it. He ascribes this to a high power of persistence which he considers the village communities of the area possessed by virtue of their origin and organization. It is remarkable, however, that the area of parliamentary enclosures corresponds to the distribution of the Mesozoic rocks in England, especially to the chalks, and it is probable that further

³² Gravier, *loc. cit.*

³³ J. D. Whiting: Village Life in the Holy Land, *Natl. Geogr. Mag.*, Vol. 25, 1914, pp. 249-314.

³⁴ Maine, *op. cit.*

B. H. Baden-Powell: *The Land System of British India*, 3 vols., Oxford, 1892; *The Indian Village Community*, London, 1896. See also John Matthai: *Village Government in British India*, London, 1915.

³⁵ Matthai, *op. cit.*, reference on p. 8.

³⁶ Gomme, *op. cit.*

³⁷ Ashley, *op. cit.*, Vol. I, Part II.

investigations will ascribe the persistence to geographic environment, rather than to any peculiarity of organization of the communities of the area.³⁸ The great geographical result of enclosure upon the rural population was the development of partial or complete disseminations wherever the conditions were suitable, with the almost complete obliteration of the former system in many cases.

HAMLETS

The terms small town, village, and hamlet are purely relative. They are of considerable use, but it is not possible to give them a quantitative value, except in local cases, such as the development of villages and hamlets on contiguous areas of good and poor ground respectively. Hamlets, however, are the normal agglomerations on the poorer class of ground which is not suitable for a disseminated arrangement. They are well developed in a region such as the Ardennes and occur frequently on the Russian plain. A striking example of agglomeration was noticed by the writer in the Belgian province of Brabant, between Brussels and Charleroi, on the gently undulating country of the Tertiary clays, but he was unable to investigate it. The Dutch province of North Brabant also exhibits an agglomeration developed to an extraordinary degree on Quaternary deposits. There exist in the province 184 communes, in each of which is a village. The land is divided into very small holdings, and home industries are very important.³⁹ Otherwise Holland and Denmark are lands where dissemination prevails.

The foregoing considerations have dealt only with the sedentary types of agglomerations, which are characteristic of temperate or fertile regions. In the regions bordering both the hot and cold deserts, there is often a semi-sedentary population, which changes its place of abode according to the seasons in pursuit of pasture. The tented nomads of the desert and steppe regions of Morocco and Algeria, who occasionally practice agriculture in a fitful manner, are typical of the borders of the hot deserts, as are also the inhabitants of the shifting tent villages of the more arid parts of the Mesopotamian valley. In Algeria there is also a more advanced population practicing agriculture within the 20-inch rainfall belt. As the villagers cannot maintain fertility in the soil for long periods, they dwell in hutments, which are easily transported to new areas when the old become exhausted.⁴⁰

The case of the cold deserts is still more interesting, as an example of semi-nomadism in Europe. The regular migrations of part of the Swiss population between the valley villages and the châteaux of the Alps are well

³⁸ Gilbert Slater: The Inclosure of Common Fields Considered Geographically, *Geogr. Journ.*, Vol. 39, 1907, pp. 35-55.

³⁹ H. Blink: Studien over Nederzettingen in Nederland, *Tijdschr. Kon. Nedere. Aardrij. Genoot.* 2nd series, Vol. 21, 1904, pp. 1-45.

⁴⁰ Reference cited in footnote 9.

known, but an extreme instance is afforded by the Val d'Anniviers, where the number of groups of wooden dwellings, at different levels in the valley, which are temporarily occupied on a complicated system of migrations by the whole population at different times of the year, is out of all proportion to the number of inhabitants. The system of Anniviers is considered to be the outcome of increase in population in a restricted area from which there is practically no emigration.⁴¹

Partial Agglomerations

The area of Entre Sambre et Meuse (Belgium) is an example of a partial agglomeration with which the writer is familiar. Together with the district of Condroz to the east of the Meuse it forms a physiographic unit with a gentle general slope downwards to the northwest. It consists of a series of roughly parallel troughs and hills of long, rounded form, known locally as *tiges*, which have a general trend along the direction east-northeast to west-southwest. Though for the most part bleak and open, the country has well wooded belts which increase in extent to the south. The climate is pleasant in summer but represents the passage from the maritime Flemish plains to the rigorous Ardennes. The geological structure of the country is very accurately expressed in its physiography. The whole region lies in the Dinant basin, which consists of a series of subsidiary folds on the main, great syncline. Dissection has resulted in a number of parallel and alternating outcrops of schists (Upper Devonian) and limestone (Carboniferous).⁴² The normal physiography of folded regions has here been reversed, the long elevations of the *tiges* coinciding with the anticlines, while the troughs have been carved in the synclines. Furthermore, good supplies of ground water are obtainable in the high-lying schists of the *tiges*, while they are not in the limestone troughs.

Here again the arrangement of the population corresponds closely to the physiographic conditions. It is essentially an arrangement of villages with intervening isolated dwellings, though the latter are not abundant. The villages have, in many cases, been forced to occupy the bleak tops and flanks of the *tiges*, in preference to the sheltered but often waterless limestone troughs.⁴³ Favorable positions for isolated dwellings are, however, by no means lacking, and there is a fair scattering of farmhouses between the villages. The rural occupations are more varied than usual. Though the country is essentially agricultural, forestry is very important. Iron ore occurs in the neighborhood of Gerpinnes but has not been worked since the opening of the Lorraine fields. A number of small Tertiary outliers provide opportunities for the working of plastic clays and glass

⁴¹ Jean Brunhes and Paul Girardin: Les groupes d'habitations du Val d'Anniviers comme types d'établissements humains, *Ann. de Géogr.*, Vol. 15, 1906, pp. 329-351.

⁴² M. Arousseau: An Outline of the Geology of Entre Sambre et Meuse, Australian Corps, Belgium, 1919.

⁴³ Leriche, *loc. cit.*

sands. Potteries and brickworks are to be found at various points. The limestones are often quarried for building purposes and for lime burning, while the schists are worked for paving stones. Most of the older houses are built of stone in preference to brick, and the village streets are frequently cobbled. There is a tendency to plant forests on the high-lying Devonian schists (*végétation calcifuge*), while agriculture is practiced largely on the carboniferous limestones of the lower ground (*végétation calcicole*). The existence of so many rural industries has led to the formation of rather large, straggling villages and has rendered necessary a system of light railways.

Disseminations

The modern tendency towards dissemination usually achieves its most complete development on fertile ground. Disseminations generally result from the voluntary breaking away from older organizations in ancient countries, but under certain circumstances dissemination has been enforced. The normal method of settlement of the newer lands is by dissemination, though America was exceptional in that the early white settlement was under the village community system. We will examine three forms of dissemination which have been brought about by voluntary action.

COMPLETE DISSEMINATION: FLANDERS

The French part of the plain of Flanders constitutes about three-fifths of the Département du Nord and a small corner of the Pas-de-Calais. It stretches from the sea to the Scheldt and the Sensée. The landscape is flat and enclosed, with occasional noble vistas through the trees into green and fertile distances, dotted with red (thatched or tiled) cottages, and seldom broken by an undulation until the foothills of Artois are reached. The only feature of importance is the beautiful chain of residual heights stretching from Cassel to Kemmel and studded with windmills. Ditches and hedges line the roadsides and fields; sluggish brooks, tamed and canalized streams, and long canals traverse the plain. Woods are rare; but trees abound, distributed regularly around the edges of fields and along the roadways. Not an acre of ground remains untilled except the rich little pasture field on each farm. The roads are straight and tend to cross at right angles. The whole scene is one of checkerboard regularity and garden formality, recalling the picture-book landscapes of our childhood or the Solano target.

The predominant formations are soft clays (Lower Eocene—Yprésien). Though the soil is not of the best quality in itself, it has been wonderfully enriched by prolonged scientific agriculture. The climate is maritime, humid, and more temperate than that of Picardy. The waterways are seldom frozen sufficiently to bear a skater.

With a good soil, providing abundant ground water, holdings are small and every man lives on his farm. Ground water is so abundant that many of the farmhouses are moated, and all possess a pool. An elaborate system of draining and ditching is necessary. Mixed farming is practiced, under an intensive system of agriculture. The houses are so placed that there is easy access to all parts of the farm and to the neighboring road,⁴⁴ and they are so thickly and evenly scattered that true villages are often difficult to define. Small, straggling towns merge imperceptibly into the normal countryside. The general arrangement here, as in Picardy, gives the map a characteristic appearance, the regular intersections of roads and ditches giving rise, in such regions as that to the southwest of Armentières, to a series of perfect parallelograms, best seen on the 1:40,000 scale maps. Though Flanders was under the influence of the Roman and manorial systems, no trace of them is recognizable in the present arrangement, which may, however, have been facilitated by the fact that the one-field system—according to Seeböhm—was in vogue in the region. We may regard the Flemish arrangement as a complete dissemination, but it must be remembered that the *close* settlement of the region was brought about by the conscious rise of Belgian agriculture in response to internal economic conditions and foreign relations. The whole of Flanders exhibits to a remarkable degree the effects of human occupation in the restraint and artificial modification of Nature.

LINEAR DISSEMINATION: LANDRECIES

The country in the neighborhood of Landrecies affords an example of a linear dissemination which is none the less complete and is very striking, especially as the predominant formation is calcareous. This area lies to the east of the old provinces of Artois and Picardy and on the map greatly resembles them in topography. It is, in reality, a very different region. Whereas Picardy seldom rises above the 100-meter contour the relief of the present area lies between the contours of 140 meters and 210 meters. The greater elevation is not apparent, the dissection being more juvenile; and the broad, sweeping outlines of the chalk are far less pronounced. Surface water is much more abundant than in Picardy, the area being drained by a number of small, swift streams, which have a general northwesterly trend. They are the headwaters and upper tributaries of the Sambre. It is noteworthy that the average annual rainfall of Avesnes is from 800 to 900 millimeters—the same as that of Le Cateau, Arras, and Bapaume, which lie to the west. The landscape is enclosed, and distant views are only obtainable from the higher hilltops, whence the country stretches out as a gently undulating expanse of small, hedged pasture fields and orchards. Forest timber, as elsewhere in the Départe-

⁴⁴ Blanchard, work cited in footnote 24, pp. 420-423. A good illustration of the dissemination of population is given by Vidal de la Blache, *La France* (Paris, 1908), of the area round Cassel (Fig. 23).

ment du Nord, is confined to a few large areas, such as the Forêt de Mormal and the Forêt du Nouvion, an arrangement which appears to be the outcome of space economy.

The arrangement of dwellings is most remarkable. The numerous crooked roadways are everywhere lined with houses, which are often close together and are placed indiscriminately on the hilltops or in the valleys. They are seldom situated centrally on the holdings, which are frequently long and narrow and lie at right angles to the roads. The many places named on the map can hardly be regarded as villages, except where the intersection of roadways brings about a concentration of dwellings. The grouping might, without exaggeration, be termed linear. The explanation of it is not difficult. The white chalk (Senonian) of the regions to the west has given place to an argillaceous chalk (Turonian) which, as in England,⁴⁵ is less suitable for agriculture but yields here a sufficient supply of shallow ground water, provides excellent pasture, and is suitable for pome fruit culture. The local occupation is hence dairying varied with fruit growing; and the dwellings are so placed that the handling of farm products is reduced to a minimum. As in Flanders, all traces of the manorial system have been obliterated by a subsequent readjustment. The area extends somewhat beyond the limits of description and resembles the small Belgian region of the Pays de Herve.⁴⁶

INCOMPLETE DISSEMINATION: CORNWALL

Cornwall exhibits a dissemination which is not complete but which has advanced considerably beyond the partial stage. It is a country of strong, though not of rugged, relief. Its picturesque hills sweep from an embayed coast, abounding in drowned valleys, up to the high, rounded granite moors carpeted with gorse and heather. Its streams and wooded valleys are numerous and small, and the roads are like switchbacks. From high positions it spreads out a rolling expanse of greenery, divided into innumerable small areas by sinuous lines of stone walls, overgrown with brambles, hazel, dwarf oak, and a multitude of small flowering plants. The retarded denudation has resulted in a softening of general outline, slight aggradation of the valley floors, silting up of the headwaters of harbors, and a depth of good soil over the predominant, steeply inclined Devonian grits and soft slates. The climate is mild and maritime, with much wind and frequent rains.

The population of the slate and grit areas is purely agricultural, practicing mixed farming, while that of the granite areas and their vicinity is occupied in mining tin and china clay. Around the coast there is an important maritime element. The few large towns are on the coast or at the headwaters of harbors; the distribution over the whole country is

⁴⁵ McConnell, *op. cit.*

⁴⁶ Leriche, *loc. cit.*

hence fairly even. We are here concerned chiefly with the agricultural population of mid-Cornwall. True villages are few and far between. The usual so-called village is only a small, loose nucleus; and the greater number of names on the map apply to estates or farmhouses. It is probable that many such names are records of villages which existed formerly. They recall the place names in the Landrecies area. The arrangement of the population is a thin, fairly even dissemination with an occasional village. The houses are situated in positions of convenience on the farms, which vary in size from 80 to 400 acres, 120 acres being about the average. The houses are half a mile or more apart, except in the mining areas, where small rows of miners' cottages occur. There is no habitual selection of low sites, although there are sometimes limits to the supply of ground water. There is a large amount of common land and wooded land, but its distribution is such that it does not often modify the general arrangement. The original settlement of Cornwall was under the tribal system, which later gave way to the manorial system of which the estate and an occasional lonely church or place name are the present day representatives. Voluntary enclosure has brought about the present state of affairs. The system of rural land tenure today is one of leasehold, frequently for a number of lives, i.e. a farm is leased to a family for three or four generations. This system brings about a permanence of boundaries which is well expressed by the universal stone walls, known locally as hedges. This has perhaps retarded the tendency to complete dissemination, but it must be borne in mind that Cornwall is a thinly populated country. The survival of certain villages may be ascribed to the fact that the manorial population of the country consisted largely of cottars and bordars, and even at the present day the farm laboring class is a large one.

ENFORCED DISSEMINATION: THE BALTIC PROVINCES

A striking example of enforced dissemination is seen in the Baltic countries of Esthonia, Livonia, and Courland, which together constitute a region of isolated farms. Dissemination in Courland dates from the seventeenth century. In these districts it has been brought about by the systematic action of the nobles of German origin, especially since the liberation of the serfs (1816-1819). Recognizing dissemination as the most advantageous form of occupation of the land, they proceeded in thorough Teutonic fashion to encourage or if necessary to force their tenants to break away from the old order, with complete success.⁴⁷

Causes and Correlation

From the above consideration of various arrangements it would appear that definite grouping of rural populations is a conscious human response

⁴⁷ Woeikof, *loc. cit.*

to, rather than an actual physiographic control by, a number of factors in each region, chief amongst which are the following:

1. The type of pursuit to which the area is best adapted.
2. The nature of the ground water supply, rainfall, and surface water.
3. The quality of the soil.
4. The minimum size of holdings.
5. Space economy.
6. Any special local physiographic conditions.
7. The topography of the region, the effect of which is relatively slight.

It is possible to correlate freely developed arrangements to some extent with human regions,⁴⁸ village survivals, for example, being somewhat characteristic of the zone of effort while disseminations tend to occur in the zone of increment; but, as has been indicated, the factors which influence arrangement are so numerous that only the more extreme types are likely to exhibit any extensive development or broad distribution.

On a previous page it was stated that the various arrangements are not capable of systematic classification; nevertheless the following table was found extremely useful by the writer and is an attempt to express the relationships between the arrangements which have been recognized and their response to geographic environment. It is a recognition of system rather than an attempt at classification, as which it would be open to serious criticism. An American ranch, for instance, may really correspond to a wet point village; and a wet point village may, in turn, be also a strong point village. Any of the recognized forms of villages may occur under the heading "regions of diverse physiographic elements," and the vertical distribution of certain wet and dry point villages is not taken into account. Again, disseminations are linked with the zone of increment; but the Nile Delta, which is a typical zone of increment, has not developed a dissemination for very obvious reasons. The table does, however, bring out clearly the important fact that the human groups are the true subject of study, rather than the assemblages of dwellings by which the arrangement of the human groups is expressed.

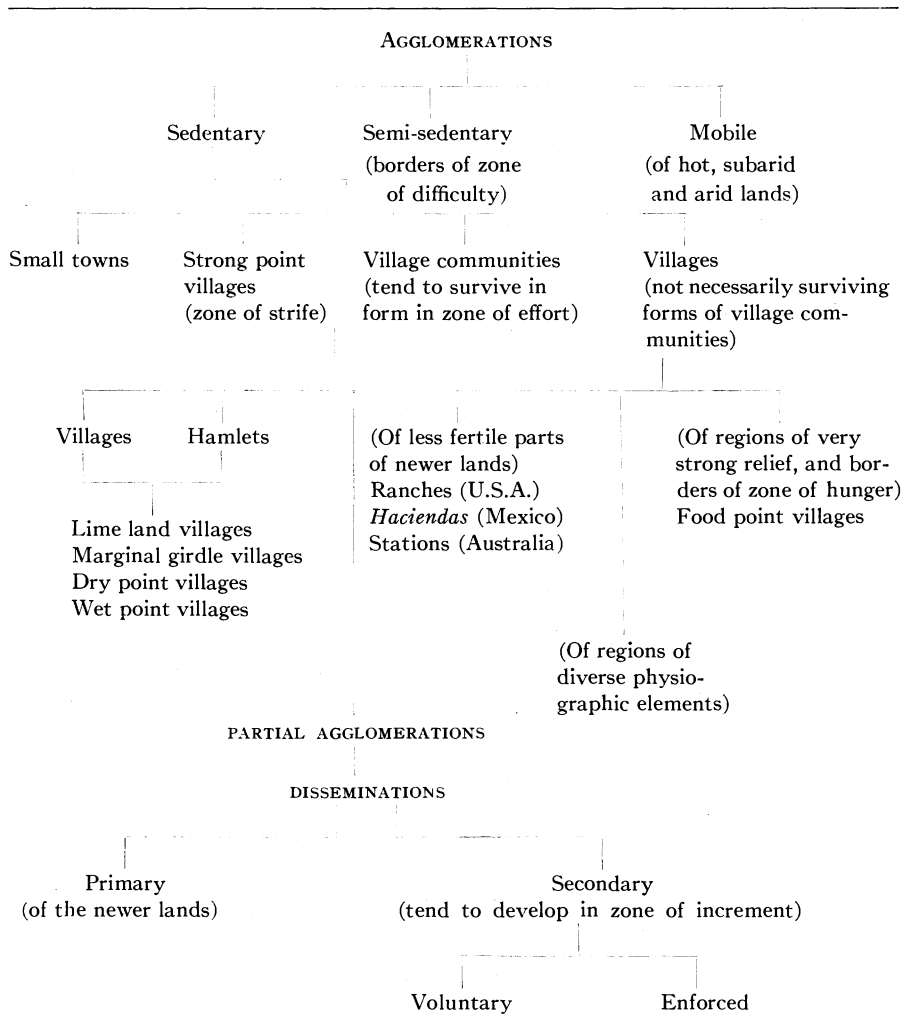
THE CAPACITY OF RURAL DISTRICTS

The study of natural regions and the arrangement of their rural populations is a matter of considerable importance especially in old and densely populated countries. There is necessarily a limit to the capacity of a region, and efforts have been made at different times to estimate the number of inhabitants a country will support.⁴⁹ This will depend largely on the

⁴⁸ Fleure, article cited in footnote 30.

⁴⁹ A. P. Brigham: The Distribution of Population in the United States, *Geogr. Journ.*, Vol. 32, 1908, pp. 380-389; reference on p. 387.

factors enumerated in the foregoing section and on the climate. As an area begins to approach its capacity, space economy will increase in importance and will react on the minimum size of holdings. This is already in evidence in Flanders and is becoming important in the Nile Delta.



Dugard has shown⁵⁰ that a state of equilibrium exists in the Marrakesh region of Morocco between the number of inhabitants and the amount of arable land; and Breadnall states (*op. cit.*) that in the oases of the Libyan Desert there is a close correspondence between the population and the water supply. The necessary statistical study is rendered very

⁵⁰ Henry Dugard: *Le Maroc* de 1917, Paris, 1917.

difficult in the estimation of capacity, as administrative units rarely correspond in any way with natural regions. The only method open to the geographer is to make a statistical study of the smallest administrative areas of the country under consideration and to regroup them subsequently in such a manner that they will correspond as nearly as possible to the natural regions. The great difficulties of the subject have been examined and stated by Tronnier.⁵¹ Such study is of great economic utility, however, and reveals in a startling way the reasons for the unnecessary depopulation of certain areas.

⁵¹ Richard Tronnier: *Beiträge zum Problem der Volksdichte*, Stuttgart, 1908.